



LEGEND

- I Less than 10 bushels per acre of improved land.
- II 10 to 20
- III 20 to 30
- IV above 30

NOTE

The absence of color indicates a population of less than 2 to a square mile, being practically an absence of settlement.

MAP OF THE
UNITED STATES
SHOWING THE RELATION BETWEEN THE
PRODUCTION OF OATS
IN BUSHELS AND THE AREA OF IMPROVED LAND IN ACRES
Compiled from the Returns of Agriculture at the Tenth Census
1880.

OATS.

Oats stand the third cereal in importance in the United States. The acreage and total production in 1879 amounted to 16,144,593 acres, producing 407,858,999 bushels. The actual production at the several decades, with the percentage of increase by decades, and also the percentage of increase since 1839, is seen in the following table:

TABLE LIX.—ACTUAL PRODUCTION BY DECADES, ETC.

Year.	Production.	Per cent. of increase by decades.	Percent of increase since 1839.
	<i>Bushels.</i>		
1879.....	407,858,999	44.6	231.4
1869.....	282,107,157	63.4	120.2
1859.....	172,043,185	17.8	40.3
1849.....	146,584,179	19.1	19.1
1839.....	123,071,341		

The following table shows the estimates, acreage, and production by the United States Department of Agriculture for the years since the previous census enumeration:

TABLE LX.—ESTIMATES OF THE UNITED STATES DEPARTMENT OF AGRICULTURE OF ACREAGE AND PRODUCTION OF OATS, 1870-1880.

Year.	Area sown.	Production.
	<i>Acres.</i>	<i>Bushels.</i>
1880.....	12,756,732	355,553,084
1870.....	12,083,500	363,701,320
1878.....	13,170,500	413,578,560
1877.....	12,820,148	400,304,000
1876.....	13,358,908	320,884,000
1875.....	11,915,075	354,317,500
1874.....	10,897,412	240,369,000
1873.....	9,751,700	270,340,000
1872.....	9,000,700	271,747,000
1871.....	8,305,800	255,743,000
1870.....	8,702,305	247,277,400

The production by states, in the order of their production, with data pertaining thereto, is given in the following table:

TABLE LXI.—OATS CROP OF 1879 (CENSUS OF 1880).

No.	States.	Acres.	Bushels.	Per cent. of total product.	Cumulative per cent.	No.	States.	Acres.	Bushels.	Per cent. of total product.	Cumulative per cent.
1	Illinois.....	1,059,889	63,189,200	15.49	15.49	26	Dakota.....	78,226	2,217,132	0.54	90.25
2	Iowa.....	1,507,577	50,010,591	12.41	27.90	27	Mississippi.....	108,497	1,039,020	0.48	90.73
3	New York.....	1,261,171	37,575,506	9.21	37.11	28	West Virginia.....	126,031	1,008,505	0.47	97.20
4	Pennsylvania.....	1,237,593	33,841,430	8.30	45.41	29	Maryland.....	101,127	1,794,872	0.44	97.64
5	Wisconsin.....	955,597	32,905,320	8.07	53.48	30	Washington.....	37,962	1,571,700	0.38	98.02
6	Ohio.....	910,388	28,004,505	7.03	60.51	31	California.....	49,947	1,341,271	0.33	98.35
7	Minnesota.....	617,409	23,382,158	5.73	66.24	32	New Hampshire.....	29,485	1,017,020	0.25	98.60
8	Missouri.....	908,473	20,070,958	5.07	71.31	33	Connecticut.....	30,691	1,009,706	0.25	98.85
9	Michigan.....	536,187	18,190,793	4.46	75.77	34	Montana.....	24,091	600,915	0.22	99.07
10	Indiana.....	623,531	15,590,518	3.82	79.59	35	Massachusetts.....	20,050	643,159	0.16	99.23
11	Kansas.....	435,850	8,180,385	2.01	81.60	36	Colorado.....	23,023	640,900	0.16	99.39
12	Nebraska.....	250,457	6,555,875	1.61	83.21	37	Florida.....	47,002	468,112	0.11	99.50
13	Georgia.....	612,778	5,548,743	1.36	84.57	38	Idaho.....	13,107	462,230	0.11	99.61
14	Virginia.....	563,443	5,333,181	1.31	85.88	39	Utah.....	10,625	418,082	0.10	99.71
15	Texas.....	238,010	4,893,359	1.20	87.08	40	Delaware.....	17,158	378,508	0.09	99.80
16	Tennessee.....	468,500	4,722,190	1.16	88.24	41	Louisiana.....	26,801	229,840	0.06	99.86
17	Kentucky.....	403,416	4,580,738	1.12	89.36	42	Nevada.....	5,937	180,800	0.05	99.91
18	Oregon.....	151,024	4,385,650	1.07	90.43	43	Rhode Island.....	5,575	150,330	0.04	99.95
19	North Carolina.....	500,415	3,838,068	0.94	91.37	44	New Mexico.....	9,237	150,527	0.04	99.99
20	Vermont.....	99,548	3,742,282	0.92	92.29	45	Wyoming.....	822	22,512		
21	New Jersey.....	137,422	3,710,573	0.91	93.20	46	District of Columbia.....	267	7,440	0.01	100.00
22	Alabama.....	324,028	3,030,030	0.74	93.94	47	Arizona.....	29	564		
23	South Carolina.....	201,445	2,715,505	0.67	94.61						
24	Maine.....	78,785	2,265,575	0.56	95.17		Total.....	16,144,593	407,858,999		
25	Arkansas.....	106,513	2,219,822	0.54	95.71						

It will be seen that five states produce 53 per cent. of the crop, and ten states 80 per cent. At each previous census enumeration five states have produced from 56 to 63 per cent. of the total crop, and ten states from 78 to 84 per cent., as is shown in the subjoined tables, which give the ten states leading in production at each of the decades in the order of their total production.

Four of the states and territories, viz, Maine, Vermont, New York, and Wyoming, raise more oats than any other cereal; twelve raise more wheat; twenty-nine raise more corn, and two raise more barley.

The following tables show the ten states leading in production in preceding census years:

TABLE LXII.—OATS CROP OF 1839 (CENSUS OF 1840).

No.	State.	Amount of crop.	Per cent. of total production.	Cumulative per cent.	No.	State.	Amount of crop.	Per cent. of total production.	Cumulative per cent.
		<i>Bushels.</i>					<i>Bushels.</i>		
1	New York	20,075,847	17	17	6	Tennessee	7,035,078	6	60
2	Pennsylvania	20,041,819	17	34	7	Indiana	5,981,005	5	74
3	Ohio	14,803,103	12	46	8	Illinois	4,988,008	4	78
4	Virginia	13,451,062	11	57	9	Maryland	3,534,214	3	81
5	Kentucky	7,155,934	6	63	10	North Carolina	3,103,941	3	84

TABLE LXIII.—OATS CROP OF 1849 (CENSUS OF 1850).

No.	State.	Amount of crop.	Per cent. of total production.	Cumulative per cent.	No.	State.	Amount of crop.	Per cent. of total production.	Cumulative per cent.
		<i>Bushels.</i>					<i>Bushels.</i>		
1	New York	26,552,814	18	18	6	Kentucky	8,201,311	6	62
2	Pennsylvania	21,538,156	15	33	7	Tennessee	7,703,080	5	67
3	Ohio	13,472,742	9	42	8	Indiana	5,655,014	4	71
4	Virginia	10,179,144	7	49	9	Missouri	5,278,079	4	75
5	Illinois	10,087,241	7	56	10	North Carolina	4,052,078	3	78

TABLE LXIV.—OATS CROP OF 1859 (CENSUS OF 1860).

No.	State.	Amount of crop.	Per cent. of total production.	Cumulative per cent.	No.	State.	Amount of crop.	Per cent. of total production.	Cumulative per cent.
		<i>Bushels.</i>					<i>Bushels.</i>		
1	New York	35,175,134	20	20	6	Virginia	10,186,720	6	66
2	Pennsylvania	27,387,147	16	36	7	Iowa	5,887,045	3	69
3	Ohio	15,409,284	9	45	8	Indiana	5,317,831	3	72
4	Illinois	15,220,029	9	54	9	Kentucky	4,617,029	3	75
5	Wisconsin	11,059,200	6	60	10	New Jersey	4,530,182	3	78

TABLE LXV.—OATS CROP OF 1869 (CENSUS OF 1870).

No.	State.	Amount of crop.	Per cent. of total production.	Cumulative per cent.	No.	State.	Amount of crop.	Per cent. of total production.	Cumulative per cent.
		<i>Bushels.</i>					<i>Bushels.</i>		
1	Illinois	42,780,851	15	15	6	Wisconsin	20,180,016	7	64
2	Pennsylvania	30,478,585	13	28	7	Missouri	10,578,313	6	70
3	New York	35,203,025	13	41	8	Minnesota	10,678,261	4	74
4	Ohio	25,347,540	9	50	9	Michigan	8,954,400	3	77
5	Iowa	21,005,142	7	57	10	Indiana	8,590,400	3	80

In the distribution of the crop in respect to latitude there is not that concentration of production between certain parallels that is shown in either of the preceding grains. The amount grown within each of the three degrees of latitude between 40 and 43 is nearly the same, the aggregate amounting to 224,566,499 bushels, or about 55 per cent. Three of the topographical divisions produce about the same proportion of the whole crop, as follows:

	<i>Bushels.</i>
Group 16, prairie region	149,510,119
Group 8, interior plateau	46,664,913
Group 13, Mississippi river belt, north	30,834,000
Total	227,009,032



It will be seen that these three topographical divisions produce 55.7 per cent. of the whole crop (Table XVI, p. 11).

Considered by drainage areas, the Mississippi basin produces 63.1 per cent. of the whole crop, or almost precisely the same percentage of oats that it does of wheat (Table XVII, p. 12).

The distribution according to elevation (Table XVIII, p. 13) shows that over 91 per cent. of the crop is grown between the altitudes of 100 and 1,500 feet, thus:

TABLE LXVI.—DISTRIBUTION ACCORDING TO ELEVATION ABOVE THE SEA.

Elevation above the sea.	Bushels.	Per cent of total.
100 to 500 feet	47, 554, 528	11. 7
500 to 1,000 feet	210, 227, 750	51. 5
1,000 to 1,500 feet	115, 869, 400	28. 4
	873, 651, 684	91. 0

Oats belong normally to a cooler climate than that which is best adapted to wheat, or at least to one with cooler summers, such climates producing grain of greater weight per bushel and of greater excellence for all of the purposes for which the grain is grown. Most cereals attain their greatest production in this country, where the quality of grain produced is the best. Not so with oats, the place of greatest production being rather to the South, that section producing grain of greater weight per bushel; and hence the weight of American oats is usually less than that of most other countries where it is a similarly important crop. The table of distribution according to temperature (Table XIX, p. 14) shows that a little more than one half of the whole crop grows where the mean annual temperature is between 45 and 50 degrees, and the table of distribution according to mean January temperature (Table XXI, p. 15) shows that the greatest production is where the mean is between 20 and 25 degrees, and 330,093,761 bushels, or 80.9 per cent. of the crop, grows where it is below 30 degrees. This is equivalent to saying that about five-sixths of the crop grows where the January temperature is below the freezing point.

There are winter varieties of oats, as there are also of wheat, rye, and barley, but these varieties produce a very insignificant part of the whole crop, probably altogether but a small fraction of one per cent. All the rest being a spring crop, and very little of it being harvested before the first of July, its distribution according to the July temperatures (Table XX, p. 14) is of much more interest.

TABLE LXVII.—DISTRIBUTION OF CROPS ACCORDING TO JULY TEMPERATURE.

Temperature.	Bushels.	Per cent.
65° to 70°	48, 517, 400	11. 9
70° to 75°	218, 143, 107	53. 5
75° to 80°	112, 819, 167	27. 7
	879, 479, 764	93. 1

The tables of distribution according to rainfall show that four-fifths of the crop is where the mean annual rainfall is between 30 and 45 inches (Table XXII, p. 16) and where the spring and summer rainfall is between 15 and 25 inches (Table XXIII, p. 16).

HISTORY OF OATS.

Oats have played a much less important part in the early history of our race than either wheat, barley, or rye. In the hot, dry climates about the Mediterranean and eastward, the cradle of our civilization, this grain does not grow well, and has less value than barley; hence its place as a food for animals and for man is occupied by other crops. It is not mentioned in the Holy Scriptures (Solomon fed his horses and dromedaries on barley), but it appears to have been sometimes cultivated in a small way in Italy as early as the Christian era as a food for horses, but we have little information relating to it until long after. It was cultivated by the pre-historic inhabitants of central Europe, and is found in the remains of the lake habitations in Switzerland; but Professor Heer states that it did not appear until the Bronze age, and long after the appearance of wheat and barley.

When central and northern Europe (where the grain grows much better) became civilized its cultivation became vastly more important, becoming in some of the cool, moist climates north the most important cereal used for human food. In Scotland, particularly, it became the chief bread-plant of the people, and one-fifth of the arable land was devoted to it. It was also an important, if not the chief, bread-plant of the adjacent islands, and of Iceland and Scandinavia.

The term "bread" is here used in the sense of any farinaceous food produced from grain, whether made into light loaf or baked into cakes and used as a substitute for loaf, and also for those forms of food prepared by boiling rather than by baking, but which take the place of actual bread in the social economy of the people. In this sense oats was an important bread-plant, although it is extremely difficult to make a light loaf from it.

NATURAL HISTORY OF OATS.

All the varieties of oats belong to the genus *Avena*, a genus having wild as well as cultivated species. The origin of the cultivated kinds, however, is unknown, nor is it known whether all have descended from one original wild species. The most common opinion among botanists, however, is that all of the cultivated varieties have descended from one original species; but there are, however, three pretty well defined classes of cultivated oats, and some botanists believe these classes to have been derived from three distinct species. All of the more common varieties have their husk adherent, and oats of this kind are divided into two general classes. In one class, of which the potato oat is a good illustration, the panicle, which produces the heads, branches from either side of the stem. Some botanists include all of these varieties in one species, the *A. sativa*, L., while another class, known as Oriental, Turkish, Tartary, Egyptian, Hungarian oats, and so on, are all one-sided; that is, the heads branch on only one side of the stem, and these they have considered a second species, *A. orientalis*, Schb. These two classes produce nearly all of the oats grown in the world. There are also certain naked or "skinless" varieties, popularly called Chinese oats, Skinless oats, and the like, in which the husk separates from the naked seed or kernel, and these have been considered as forming a third species, *A. nuda*, L. These, in turn, have been divided by still other botanists into even more species, but it would be unprofitable to follow up the opinions that have been held regarding the specific character of the different varieties.

Oats grow on all kinds of soils, from heavy clays to light sands, and on dry and moist soils, and the grain will pay on both rich and poor lands. It is exposed to fewer injuries than most other grains, is less affected by insects, rust, and smut than wheat and rye, and has a wider range of climate for profitable cultivation than wheat. But correlated with all this, as has been stated before, there is a greater variety in the grain produced as regards plumpness, weight, and nutritive value. The heaviest is produced in comparatively moist climates. Scottish writers on agriculture usually speak of oats as weighing from 42 to 50 pounds per bushel. In the United States they very rarely indeed reach 50 pounds, although there are cases where this weight has been attained. As a whole, the oats of the United States are much lighter than those of Scotland, or even of England, where the summer climate is cooler and moister, the grain becoming lighter in the regions of greater heat and greater liability to summer drought.

The most common legal weight of oats, as will be seen from Table XCV, is 32 pounds; but it varies from 26 pounds, in Maryland, to 36 pounds, in Oregon and Washington—a much greater range than exists with any other grain. The weight of the grain as actually produced varies still more. In answer to special schedule question 118, "What is the range in weight per bushel of the crop of 1879, the lightest in pounds, the average, and the heaviest?" the range was given all the way from 20 to 45 pounds, comparatively few, however, going below 25 or above 40 pounds, but a large number falling between 25 and 40. All of the greater oat-producing states gave the highest weight of their oats at above 40 pounds. In Washington the range was given from 32 to 46 pounds; in Dakota, from 31 to 45; in Oregon, from 30 to 50. What the maximum weight of oats grown in the United States is, is uncertain, but a number of unauthenticated reports of oats weighing over 50 pounds per bushel have come from Montana, Idaho, Oregon, and Washington. The usual weight in commercial transactions is 32 pounds per bushel, which is also the legal weight in most states. Oats cease to be profitable for grain when they weigh less than 25 pounds per bushel, although there is much grown where the average weight is less than this, partly because of the value of the straw.

Oat straw is usually considered more valuable on the farm than that of either wheat or barley. Being less harsh, cattle prefer it for food. It is also used for beds, for packing, and for similar uses in the arts. Oat straw is of less value than that of rye for the manufacture of paper, and in the eastern states it is less valuable than that of wheat, but certain paper-mills prefer oat to wheat straw.

In regions where it is more difficult to produce hay from grass, particularly in the states east of Arkansas and south of Kentucky and Virginia, oats are frequently grown and cut green for hay. They are grown also for this purpose to some extent in California, but perhaps not so much as barley. In the southern states they are also grown as a green forage crop, being pastured off. This use of the crop is apparently increasing, and has several advantages to recommend it. It furnishes good forage, leaves the ground in a nice condition for the next crop, plays the part of a green manure, and helps to check the growth of weeds.

CULTIVATION OF OATS.

Little need be said regarding the special cultivation of oats. The ground is prepared as for other spring crops. The seed is then sown broadcast and harrowed in, and the crop harvested and thrashed in the same way as wheat. At harvest the most of it is bound into sheaves, but in some places, particularly in the western states, it is handled unbound, as is the common practice in the Old World.

OATMEAL.

Oats vary greatly in the amount of meal that they produce, only the very best kinds producing half their weight. This grain, when ground, is never called oat "flour", but always oat "meal", and in the United States this term is used somewhat differently from what it is in Europe, where the method of manufacture has been first to grind the



grain so high (that is, with the millstones set so wide apart) that only the husk is removed, the substance of the grain remaining being known as "groats". Afterward the groats are reground closer and finer, and the material thus produced is known as "oatmeal". This oatmeal is of two kinds—a finer, used for the famous oat-cakes (or bannocks of Scotland); the other coarser, for making porridge, which is the common way in which it is eaten in most European countries, and the only way in which it is used here. In this country we apply the term "oatmeal" to what, according to this description, would be called groats in Scotland.

It is claimed that this is the most wholesome and nutritious of all kinds of food made exclusively of cereals. Whether it is true that oatmeal is actually more wholesome or more nutritious than cracked wheat, for example, is very questionable, but it certainly is more palatable to most people. In the United States oatmeal in any form has been but sparingly used for human food until within a very few years, but of late its consumption has increased enormously, many grocers now selling as many barrels per year as they sold pounds less than a score of years ago. This increase in the use of oatmeal is most marked in the cities of the older states, but it has extended to the villages and farms, and even to the farthest frontier settlements. It is now manufactured in many places, and several special machines have been devised in this country for producing meal of various qualities and characters.

CHEMICAL CHARACTER OF OATS.

Nearly forty years ago Professor John P. Norton, then an American student at work in Scotland, made an extensive chemical examination of oats as they grew in that country. With the advance of chemical knowledge other, but less extensive, investigations have since been made in Europe upon oats grown there, but American oats have not previously been made the subject of any chemical investigation. Accordingly, I have had a few analyses made (numbers 274 to 299, inclusive, Table XXV, p. 41). The strengthening or muscle-producing value of oats depends upon the amount of their albuminoids, and, as a whole, the proportion of albuminoids is greater in the heavy oats than in the light ones, amounting to but 8 or 10 per cent. in some of the lighter varieties analyzed, and rising to more than 14 per cent. in some of the others. Oats contain also a large amount of fat, ranging from 4 to nearly 6 per cent. A few samples of oatmeal also were analyzed, and, for comparison, one of a very popular truly Irish oatmeal. The analyses show that all of the American samples (the product of oats from several states and from different manufacturers) were richer in albuminoids than this sample of Irish. They did not, however, contain quite so much fat. It will also be noticed that the average composition of these oatmeals is richer in albuminoids than the richest wheat flours, and is more than $3\frac{1}{2}$ per cent. greater than their average composition. In the series of analyses given an attempt was made to embrace oats grown under different conditions and of considerable variety of weight. It would require a hundred or more analyses to set at rest all the questions which arise in this connection, but it would doubtless be an exceedingly valuable contribution to our knowledge of the comparative nutritive values of the oats grown in different portions of the United States and their relative economic values. As sold in the markets now the heaviest oats are much the cheapest ones to buy, containing more of the nutritive elements and relatively less bran. No analyses were made of grain weighing less than 30 pounds to the bushel.

VARIETIES OF OATS.

With these facts regarding the relation between nutritive value and weight before us I will now consider the subject of varieties. There is even more confusion respecting varieties of oats than of either wheat or corn, because they have a still greater tendency to change when the seed from one region is carried into another. The most marked change is a deterioration in weight when heavy oats are carried from a cooler to a warmer region. I have already alluded to the classification of oats into three classes, one of which has the seed naked, and the other two are characterized by the disposition of the heads, whether one-sided or not. There are other systems of classification, one of which is to classify the varieties according to the shape of the grains. Certain agricultural writers make two classes: one class with short, plump, rather blunt grains, smooth and shining skin, and beardless, of which the potato oat may be taken as a type; the other, with longer and narrower grains, and with a tendency to produce awns or beards, and, as the grains generally grow in pairs, for the smaller one to remain adherent to its larger brother. In practice this classification is not good. Oats may be found of every intermediate grade, from the most plump to the thinnest, and from those without awns to those of the longest, and there is a continual tendency for these characters to change.

In this connection it may be interesting to make certain comparisons with the wild oats of California, *A. fatua*, L. This is a native of the region about the Mediterranean sea, southern Europe, western Asia, northern Africa, and the contiguous islands. It has very long awns, which are hygroscopic, twisting when they become dry, and with an angle about midway. When moist, they untwist and become straighter; in fact, each individual hair on the somewhat hairy grain twists and untwists with each change in the amount of moisture in the atmosphere. The seeds, falling on the ground, therefore move and crawl about, as it were, with the changes of the atmosphere, insinuating themselves into cracks in the soil or under clods of earth, and thus plant themselves. This species from the Old World was adventitiously introduced into the New, and as a weed, following Spanish immigration, has spread along the Pacific side of the continent from Chili and Patagonia on the south to Washington territory on the north, entirely covering great tracts of country. This is the "wild oats" of Chili, of the isle of Juan Fernandez, and of California. In the latter state it constitutes one of the most abundant and valuable of the uncultivated forage plants.

It is now believed by many scientists that this species is the parent of the cultivated oat, which has arisen by long-continued cultivation in a moister and cooler climate and by selection. Professor Bachman, of England, has given a detailed account of the production of a good quality of smooth, cultivated oats from seeds of the wild variety by a few years' cultivation and selection. Various writers claim that in a warm and dry climate common oats readily degenerate into the wild form, and it is a common theory that the widespread existence of this species on the western coast of America arises from the deterioration of cultivated oats, becoming first the "volunteer", and finally the wild oat. While this is not proved, there are many reasons given for adopting the hypothesis, and the subject is introduced in this connection to illustrate, what has been widely observed, the exceedingly variable character of oats and the tendency of the grain to become lighter and the beards longer as the summers become hotter and drier.

That heavy oats from a more northern and cooler region carried into a warmer and drier one rapidly degenerate as to weight there is no question whatever. It has been, and is still, practically impossible in drier and warmer regions to keep up the weight of oats by mere cultivation and selection, no matter how much care is taken in the selection of the seed or in the cultivation of the crop. Heavy oats, grown in a region where the crop is ordinarily heavy, and carried into another region where the oats are lighter, become lighter, although for a time they produce a heavier article than that from home-grown seed.

As a consequence of this a considerable trade is carried on in seed oats from places north to those farther south. The importation of Scandinavian oats (particularly from Norway) into our northwestern states is also carried on to some extent with such an increase of crop that it is a question whether the subject is not one of sufficient importance to induce the national government to furnish the means for transporting seed oats from Norway into these regions from year to year. That the weight produced from seed so obtained is greater is well demonstrated, and in numerous oat-growing localities the best grain is always produced from seed brought from some point farther north. When cultivated continuously in such a region, in the course of a few years the weight settles down to that of the ordinary oats of the region, be that 34, 32, 30, or fewer pounds per bushel. From experiments made in Michigan on seed introduced from Norway and from Canada I am informed that the weight would fall from 42 pounds per bushel the first year to 36 or 34 pounds in three or four years, according to the locality, and that with imported seed weighing 42 pounds the first crop would weigh 38 or 40 pounds, the next crop a pound or two less, despite all care, and this deterioration would go on until the weight was that of the average weight of the grain of the region. In some oat-growing localities, however, no such increase is produced, and the best grain in such localities is always produced from home-grown seed, which has been the result of long-continued selection. In Washington territory, in portions of New York, and in other places that have been reported, there are local varieties which are heavier than any that can be got from seed grown elsewhere. The sample 293 of the analysis tables (p. 41) from Long Island is an illustration. It has long been cultivated in that locality, and weighs 42 pounds per bushel, which is heavier than they can get in that locality from imported seed. But this home-grown seed represents a long-continued selection, extending over many years, during which time only the plumpest and heaviest seed has been grown in a locality well adapted to the crop, until a local variety is produced which, in that region, does better than any that has been introduced from elsewhere.

MISHAPS TO OATS.

Oats are not particularly liable to special mishaps. In answer to questions 126, 127, and 128, regarding the mishaps to which the crop is most subject, and whether that of 1879 suffered damage from smut or rust, and what varieties are affected or injured least by rust, it appears that the most common mishap is that produced by drought; next to that came injury by lodging from too rank growth; and that neither rust nor smut affects the crop extensively, although either of these diseases occurs occasionally. No especial remedies have been suggested. The oat crop in this country is seldom sufficiently diseased by smut to cause much loss, and little, if indeed any, care appears to have been taken for its prevention, and rust is so much dependent upon the season that there are no attempts to mitigate it. The following memorandum relating to the insects which affect the crop is by Professor Riley:

INSECTS INJURIOUS TO OATS.

- ARMY-WORM (*Leucania unipuncta*, Haw.).—See wheat insects.
- FALL ARMY-WORM (*Laphygma frugiperda*, Sm. & Abb.).—See wheat insects.
- WHEAT-HEAD ARMY-WORM (*Leucania albilina*, Guenée).—See wheat insects.
- CHINCH-BUG (*Blissus leucopterus*, Say).—See wheat insects.
- GRAIN PLANT-LOUSE (*Siphonophora avenae*, Fabr.).—See wheat insects.
- CUT-WORMS.—See corn insects.
- WIRE-WORMS.—See corn insects.
- MEROMYZA AMERICANA, Fitch.—See wheat insects.
- JOINT-WORM (*Isosoma hordei*, Harris).—See wheat insects.
- ROCKY MOUNTAIN LOCUST (*Caloptenus spretus*, Uhl).—See wheat insects.
- LOCUSTS OTHER THAN ROCKY MOUNTAIN.—See wheat insects.
- INSECTS INJURING STORED OATS.—See wheat insects.